Douglas C. Schmidt
d.schmidt@vanderbilt.edu
www.dre.vanderbilt.edu/~schmidt

Professor of Computer Science
Institute for Software Integrated Systems
Vanderbilt University
Nashville, Tennessee, USA
Learning Objectives in this Part of the Lesson

- Visualize aggregate operations in SimpleSearchStream’s WordSearcher .printResults() method

See SimpleSearchStream/src/main/java/search/WordSearcher.java
Visualizing the Word Searcher.printResults() Method
Visualizing the WordSearcher.printResults() Method

- Prints the index locations of any/all of the found words

```java
wordSearcher.printResults(results);
```

Word "Do" appeared at indices 
[128|138|148|199|209|219|503|972|976|997|1004|1022|1204|1216|1231|1244|1256|1266|1275|1281|1288|1297|1303|1336|1348|1358|1367|1373|1828|1832|1853|1857|1879|1919|2251|2263|2273|2302|2309] with max index of 2309

Word "Re" appeared at indices
[131|141|151|202|212|222|979|1025|1219|1259|1278|1300|1351|1370|1835|1875|1899|1939|2266|2295] with max index of 2295

Word "Mi" appeared at indices
[134|144|154|205|215|225|982|1028|1213|1253|1345|1838|1872|1882|1885|1889|1922|1925|1929|2260|2292] with max index of 2292

...
Visualizing the WordSearcher.printResults() Method

- Prints the index locations of any/all of the found words

```
stream()
```

Input a list of search results

List
<SearchResults>

The search results correspond to words to find: "do","re","mi","fa","so","la","ti".
Visualizing the `WordSearcher.printResults()` Method

- Prints the index locations of any/all of the found words

Convert list to a (sequential) stream of search results
Visualizing the WordSearcher.printResults() Method

- Prints the index locations of any/all of the found words

Output a stream of search results

List
<SearchResults>

Stream
<SearchResults>

stream()
Visualizing the WordSearcher.printResults() Method

- Prints the index locations of any/all of the found words

```
Input a stream of search results

List <SearchResults>

Stream <SearchResults>

stream() 
collect(groupingBy(...)"
```
Visualizing the WordSearcher.printResults() Method

- Prints the index locations of any/all of the found words

```
List
<SearchResults>

Stream
<SearchResults>
```

Trigger “intermediate operation” processing
Visualizing the WordSearcher.printResults() Method

- Prints the index locations of any/all of the found words

Create a map that groups words with the indices where they were found
Output a map of strings & lists of search results

Prints the index locations of any/all of the found words

Visualizing the WordSearcher.printResults() Method

Stream<SearchResults>

Map<String, List<Result>>

List<SearchResults>
Visualizing the `WordSearcher.printResults()` Method

- Prints the index locations of any/all of the found words

**Input a map of strings & lists of search results**

```
List<SearchResults>
```

```
Stream<SearchResults>
```

```
Map<String, List<Result>>
```

```
stream()
collect(groupingBy(...))
forEach(this::printResult)
```
Visualizing the WordSearcher.printResults() Method

- Prints the index locations of any/all of the found words

Iterate through all the key/value pairs in the map
Visualizing the WordSearcher.printResults() Method

• Prints the index locations of any/all of the found words

List
<SearchResults>

Stream
<SearchResults>

Map<String, List<Result>>

This is the Map forEach() method, not the Stream forEach() method

See docs.oracle.com/javase/8/docs/api/java/util/Map.html#forEach
Visualizing the WordSearcher.printResults() Method

- Prints the index locations of any/all of the found words

List
<SearchResults>

Stream
<SearchResults>

Map<String, List<SearchResults>>

Void

Print out results of each map entry (key = word & value = list of search results)
End of Visualize Word Searcher.printResults()